

AMENDMENTS TO CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently amended) A compact high-efficiency separation column containing a plurality of vertically spaced apart separation trays, each of said plurality of separation trays comprising a normally horizontal upper wall and a normally horizontal lower wall defining an inner space between them; a means for admitting fluid to the inner space; a means for removing liquid from the inner space; a means for removing gas from the inner space; a plurality of primary separation devices within the inner space, for separating fluid into primary gas and liquid-enriched fluid, which primary separation devices comprise:

a normally vertical tubular conduit having at its lower end an inlet for fluid, which inlet is in fluid communication with the means for admitting fluid, and having at its upper end an outlet for primary gas, from which outlet an outlet conduit extends to a primary gas outlet opening in the upper wall, which primary gas outlet opening forms part of the means for removing gas;

a swirl-imparting means arranged in the conduit between the inlet for fluid and the outlet for primary gas, so as to cause, during normal operation, the formation of a layer of liquid-enriched fluid in an annular region adjacent the inner surface of the conduit downstream of the swirl-imparting means, which liquid-enriched fluid comprises secondary gas;

and which separation tray further comprises a means for removing and guiding liquid-enriched fluid from each of the primary separation devices to a secondary separation means for removing entrained liquid from the secondary gas,

wherein the secondary separation means for removing entrained liquid from secondary gas is formed by the free inner space between the upper and lower walls, which free inner space has in its lower part an outlet for liquid in fluid communication with the means for removing liquid and in its upper part a plurality of ~~an~~ outlets for secondary gas, which extends to a plurality of secondary gas outlet openings in the upper wall, which secondary gas outlet openings are located above said means for removing and guiding liquid-enriched fluid and are ~~is~~ separate from the primary gas outlet opening and forms part of the means for removing gas, at least one of which secondary gas outlet openings is arranged annularly around a primary gas outlet, and

wherein the means for removing and guiding liquid-enriched fluid entirely surrounds the uppermost end of each conduit of each primary separation device and is arranged to admit all liquid-enriched fluid downwardly into the free inner space at a position within 30% of the spacing between upper and lower walls, counted from the lower wall, along a curved trajectory at a velocity such that the entrained liquid in the liquid-enriched fluid is separated from the secondary gas to about the same low liquid content as the primary gas ÷

~~wherein the means for removing and guiding liquid-enriched fluid is arranged to receive all of the liquid-enriched fluid at a position adjacent to the normally horizontal upper wall and to admit all of the liquid-enriched fluid to the free inner space at a position within 30% of the spacing between upper and lower walls, counted from the lower wall.~~

2. (Canceled)

3. (Previously presented) The compact high-efficiency separation column according to claim 1, wherein an inlet of the means for removing and guiding liquid is formed by at least one opening in the wall of the tubular conduit of the primary separation devices, downstream of the swirl-imparting means, and wherein the means for removing and guiding liquid-enriched fluid comprises a return skirt arranged externally over the upper part of the conduit.

4. (Previously presented) The compact high-efficiency separation column according to claim 3, wherein a further inlet of the means for removing and guiding liquid-enriched fluid is formed by an annular opening between the upper end of the tubular conduit and the return skirt.

5. (Previously presented) The compact high-efficiency separation column according to claim 1, wherein the means for removing and guiding liquid-enriched fluid has an inlet at the upper end of the conduit of the primary separation devices, and is arranged to admit the liquid-enriched fluid into the free inner space at a position closer to the lower wall by at least 10% of the length of the conduit, counted from the inlet at the upper end of the conduit.

6. (Previously presented) The compact high-efficiency separation column according to claim 5, wherein the means for removing and guiding liquid-enriched fluid is formed by a return skirt that is formed integrally with the upper wall.

7. (Previously presented) The compact high-efficiency separation column according to claim 6, wherein separate outlets for primary and secondary gas are arranged in the upper wall.

8. (Previously presented) The compact high-efficiency separation column according to claim 7 and provided with a return skirt, wherein the return skirt is annularly U-shaped.

9. (Previously presented) The compact high-efficiency separation column according to claim 8, wherein the swirl-imparting means is formed from a metal plate by providing the metal plate with slits so as to define segments, followed by bending the segments out of the plane of the metal plate.

10. (Previously presented) The compact high-efficiency separation column according to claim 9, wherein the each segment has the form of a circle sector, and is bent around a radius out of the plane of the metal plate.

11. (Previously presented) The compact high-efficiency separation column according to claim 10, wherein the slits are provided by means of laser cutting.

12. (Previously presented) The compact high-efficiency separation column according to claim 11, wherein the swirl imparting means is integrally formed with the bottom wall.

13. (Previously presented) The compact high-efficiency separation column according to claim 12, wherein a plurality of primary separation devices is arranged on the corners of a regular grid, in particular a grid formed by quadratic cells or equilateral triangular cells.

14. (Currently amended) The compact high-efficiency separation column according to claim 7 [[1]], wherein at least one ~~the~~ secondary gas outlet is arranged annularly around a ~~the~~ primary gas outlet conduit and is located above the return skirt.

15. (Previously presented) The compact high-efficiency separation column according to claim 1, further characterized by the absence of means to restore linear flow to the primary gas in the primary gas outlet conduit downstream of the swirl-imparting means.

16. (Currently amended) A process of separating natural gas /condensate in the production of natural gas employing the compact high-efficiency separation column of claim 1, which column contains a plurality of vertically spaced apart separation trays, each of which comprises a normally horizontal upper wall and a normally horizontal lower wall and a plurality of primary separation devices defining between them an inner space, said process comprising the steps of:

passing a mixture of natural gas and entrained liquid condensate into said plurality of primary separation devices wherein said mixture is separated into natural gas substantially free of entrained liquid condensate and a liquid-enriched mixture of natural gas and liquid condensate;

admitting all of said liquid-enriched mixture of natural gas and liquid condensate downwardly into said inner space through means for removing and guiding liquid-enriched fluid, which means surrounds each of said primary separation devices, wherein said liquid-enriched fluid flows along a curved trajectory in said inner space at a velocity such that the entrained liquid condensate is separated from the natural gas to about the same low condensate level as the condensate level in the natural gas separated in the primary separation devices;

recovering from the said inner space natural gas having about the same low condensate level as the natural gas from the primary separation devices.

17. (Currently amended) A process according to claim 16, wherein the product separated from natural gas is water ~~for separating natural gas/water in the production of natural gas employing the compact high-efficiency separation column of claim 1.~~

18. (Currently amended) A process according to claim 16 ~~[[17]]~~, wherein the natural gas/condensate is separated at pressures of 50 bar or higher.